AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An electroslag-cold hearth system for refining or producing a metal, comprising ~~the following elements~~:

~~a) at least one~~a cold hearth vessel for melting and holding a pool of molten liquid metal;

~~b)~~ a liquid slag layer ~~situated partially above~~floating on top of the pool of molten liquid metal ~~the cold hearth vessel~~;

~~c) at least one~~a source of ~~the~~ metal ~~positioned above the liquid slag layer~~;

~~d)~~ an ingot mold for receiving molten metal from the pool of molten metal, laterally off-set from the source of ~~the~~ metal~~, and situated below a portion of the slag layer~~;

~~e) at least one~~a power supply for electrically heating the liquid slag layer; and

~~f)~~ a flow-over dam~~, separating~~ between the cold hearth vessel ~~from~~ and the ingot mold.

2. (Currently Amended) The electroslag-cold hearth system of claim 1, wherein the source of metal comprises a consumable electrode ~~of the metal~~.

3. (Currently Amended) The system of claim 2, further including means for advancing the consumable electrode toward and into contact with the liquid slag layer.

4. (Original) The system of claim 1, wherein the source of metal comprises at least one of metal revert and virgin metal material.

5. (Original) The system of claim 1, wherein the cold hearth vessel comprises a liquid-cooled reservoir.

6. (Original) The system of claim 5, wherein the cold hearth vessel is a water-cooled metal reservoir.

7. (Original) The system of claim 1, wherein the liquid slag layer comprises at least one material selected from the group consisting of calcium metal, calcium halides, calcium oxide, and mixtures thereof.

8. (Original) The system of claim 1, wherein the flow-over dam comprises a wall which permits the flow of liquid metal into the ingot mold, but substantially prevents the flow of inclusions into the ingot mold.

9. (Original) The system of claim 8, wherein the wall comprises a metallic material, and is liquid-cooled.

10. (Currently Amended) The system of claim [[1]]2, wherein the power supply comprises an electric supply means adapted to supply current to the consumable electrode and through the liquid slag layer in the cold hearth vessel, thereby keeping the liquid slag layer molten, while melting ~~the~~ an end of the consumable electrode ~~which is~~ in contact with the liquid slag layer.

11. (Currently Amended) The system of claim [[1]] 2, further comprising ~~at least one~~a non-consumable electrode ~~which is~~ in contact with the liquid slag layer.

12. (Currently Amended) The system of claim 11, including means for supplying current to the liquid slag layer through the non-consumable electrode.

13. (Original) The system of claim 12, wherein the means for supplying current comprises a second power supply.

14. (Canceled)

15. (Currently Amended) The system of claim [[14]] 11, wherein a portion of the ~~frame~~ non-consumable electrode surrounds a ~~lower end~~portion of the consumable electrode.

16. (Currently Amended) The system of claim 11, wherein the non-consumable electrode comprises ~~an upper section~~a portion of the cold hearth vessel and the ingot mold, and wherein the non-consumable electrode is electrically separated from the ~~lower section of the~~ cold hearth vessel and the ingot mold by an insulator.

17. (Currently Amended) The system of claim 11, wherein the non-consumable electrode is mounted on a structure which allows ~~it~~ the non-consumable electrode to move ~~vertically,~~ relative to the liquid slag layer.

18. (Canceled)

19. (Currently Amended) The system of claim [[18]] 17, wherein the electrically conductive material comprises graphite or copper material.

20. (Currently Amended) The system of claim [[18]] 17, wherein the electrically conductive material is covered or capped by a refractory metal.

21. (Original) The system of claim 1, wherein the metal comprises at least one element selected from the group consisting of titanium, nickel, aluminum, tin, antimony, beryllium, boron, gallium, molybdenum, niobium, tantalum, thorium, zirconium, vanadium, iridium, osmium, rhenium, uranium, and rare earth elements.

22. (Original) The system of claim 1, wherein the metal comprises titanium or a titanium alloy.

23. (Currently Amended) The system of claim 22, wherein the titanium alloy comprises titanium and at least one metal selected from the group consisting of aluminum and vanadium.

24. (Currently Amended) A system according to claim 1, ~~for electrolytically producing a metal, wherein at least a portion of the metal source of component (c) comprises at least one compound from which the metal can be electrochemically extracted~~further comprising a feed system for supplying a source material to the liquid slag layer.

25. (Currently Amended) The system of claim 24, wherein the ~~portion of the metal~~ source material comprises at least one salt ~~of the desired metal~~.

26. (Currently Amended) The system of claim 25, wherein the ~~metal is titanium or a titanium alloy, and the metal source~~ at least one salt comprises ~~at least one~~a titanium salt.

27. (Currently Amended) The system of claim 24, wherein the ~~portion of the metal~~ source ~~is in the~~material comprises a liquid or a ~~gaseous state~~gas, and ~~a gas/liquid source for the portion of the metal~~wherein the source material communicates with the liquid slag layer through a passageway.

28. (Currently Amended) The system of claim 24, ~~further including at least one additional metal source for producing the desired metal~~wherein the source material comprises a metal material.

29. (Currently Amended) The system of claim 28, wherein the ~~additional metal source comprises solid metal material~~metal material comprises titanium or a titanium alloy.

30. (Currently Amended) The system of claim ~~29~~28, wherein the ~~solid~~ metal material comprises at least one of metal revert and virgin metal material.

31. (Canceled)

32. (Currently Amended) An electroslag-cold hearth system for refining or producing a metal or metal alloy, comprising ~~at least one~~a cold hearth vessel capable of holding a pool of liquid metal and an overlying slag layer; a power supply for electrically heating the slag layer; and an ingot mold ~~which~~ that communicates with the cold hearth through a flow-over dam ~~which~~ that allows the liquid metal to flow from the hearth to the ingot mold while substantially preventing the flow of inclusions to the ingot mold, wherein a source of raw metal situated above the cold hearth is laterally off-set from the ingot mold.

33. (Currently Amended) An electroslag-cold hearth system for refining titanium or a titanium alloy, comprising ~~the following elements~~:

~~(I)~~ a cold hearth vessel for melting and holding a pool of molten liquid titanium or titanium alloy;

~~(II)~~ a calcium-based liquid slag layer ~~situated partially above the cold hearth vessel~~overlying the pool of molten liquid titanium or titanium alloy;

~~(III)~~ a consumable electrode of ~~the~~ titanium or titanium alloy, ~~positioned above~~having an end in contact with the liquid slag layer;

~~(IV)~~ an ingot mold for receiving the molten titanium or titanium alloy, laterally off-set from the consumable electrode, and situated below a portion of the liquid slag layer;

~~(V)~~ a power supply for electrically heating the liquid slag layer;

~~(VI)~~ a flow-over dam~~, separating~~ between the cold hearth vessel ~~from~~ and the ingot mold; and

~~(VII)~~ a non-consumable, electrically conductive electrode, in contact with the liquid slag layer, and ~~capable of~~electrically coupled to the power supply for providing additional thermal energy to the slag layer.

34. (Currently Amended) An electroslag-cold hearth system for electrolytically producing titanium or a titanium alloy, comprising ~~the following elements~~:

~~(A)~~ a cold hearth vessel for melting and holding a pool of molten liquid titanium or titanium alloy;

~~(B)~~ a calcium-based liquid slag layer ~~situated partially above~~overlying the cold hearth vessel;

~~(C)~~ a source for containing at least one titanium salt in liquid or gaseous form, wherein the salt can be electrochemically reduced to the titanium or titanium alloy when introduced into the liquid slag layer;

~~(D)~~ an ingot mold for receiving the molten titanium or titanium alloy, laterally off-set from the cold hearth vessel, and communicating therewith;

~~(E)~~ a power supply for electrically heating the liquid slag layer;

~~(F)~~ a flow-over dam~~, separating~~ between the cold hearth vessel ~~from~~ and the ingot mold; and

~~(G)~~ a non-consumable, electrically conductive electrode, in contact with the slag layer, and ~~capable of~~electrically coupled to the power supply for providing additional thermal energy to the liquid slag layer.

35. (Currently Amended) The electroslag-cold hearth system of claim 34, further comprising a feed system for directing titanium-based revert material or virgin titanium material to the liquid slag layer.

36. (Currently Amended) The electroslag-cold hearth system of claim 34, further comprising a consumable electrode formed of titanium or titanium alloy, and positioned so that it can be lowered into contact with the liquid slag layer, to allow for the refining of the titanium or titanium alloy while additional titanium or titanium alloy material is being electrolytically produced~~, in accordance with element (C)~~ from the salt.

37-49. (Canceled)